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GUIDELINES FOR THE PREPARATION  
OF AN ENVIRONMENTAL IMPACT STATEMENT

FOR

POTENTIAL OIL PRODUCTION

ON THE

NORTHEAST GRAND BANKS

ENVIRONMENTAL ASSESSMENT PANEL

OTTAWA, ONTARIO

JULY

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## Guidelines for the Preparation of an Environmental Impact Statement for Potential Oil Production on the Northeast Grand Banks

### NOTES

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The assessment of the potential environmental impact of any project is based on a very straightforward concept. Essentially, it involves obtaining answers to a series of very basic questions and the purpose of the attached guidelines is to ask those questions. The answers will be incorporated in the Environmental Impact Statement (EIS) for this project, to be reviewed by the Panel, the public and technical agencies.

The first, and perhaps most basic question, (Section 5), is intended to give the Panel a clear idea of the justification for the project and its effect on other development in the area. Associated with this are questions to do with alternatives to the proposed project, and the relationship of the proposed project to other facilities now in the area or planned for the future.

The second set of questions, (Section 6), asks for full details of the Proposal. The proponent, Mobil Oil Canada Ltd., will be asked to supply a precise description of the potential development/production and its location. Details of associated projects, including transportation and supply requirements, are also requested. In attempting to obtain a complete picture of the project, the Panel will also want to know the proponent's plans for construction operations and maintenance as well as what is planned when the project has served its purpose and is abandoned.

The third series of questions (and one of the most important) is intended to give the Panel a clear picture of the local environment as it exists now (Section 7). The answers to these questions will allow the Panel to compare the existing environment with the future environment if the project proceeds. This is basic to any successful environmental impact assessment. The Panel will want details of climatic and oceanographic conditions and fisheries as well as other items. Finally, the Panel will want to know about the existing human environment - the characteristics of the local population, how they earn their living, the facilities available to them for recreation, housing and other public services. All of these questions are intended to give the panel a "snapshot" of the physical and human environment of the area.

In Section 8 of the guidelines, the Panel will ask for the proponent's view of the potential impact of the project on the physical, biological and human environment. The proponent will be asked to identify the risk and possible extent of disruption of the environment as previously described. This section is intended to provide a comparison between what exists now and what could happen if the project proceeds. Having identified the possible impacts, the proponent is asked to describe the measures he intends to take to counteract or reduce those impacts. This includes contingency plans for oil spills and other hazards. Finally, any residual impacts are to be identified in section 9 and their implications discussed.

All of this material is included in the Environmental Impact Statement. For greater detail about what is required in the EIS, please consult the full guidelines attached to this summary.



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## 1.0 INTRODUCTION

The Environmental Assessment and Review Policy of the Government of Canada requires that proposed projects initiated or funded by the federal government or with federal lands involved, and which are likely to have significant adverse environmental effects, be submitted to an Environmental Assessment Panel for review prior to the issuance of the necessary authorities to proceed. The Panel, reporting to the Minister of the Environment, reviews an Environmental Impact Statement (EIS) prepared by or for the Proponent of the project, through the Initiator department.

These guidelines have been prepared in order that the environmental impact of the proposed oil production in the Northeast Grand Banks can be determined. The Initiator for this project is the Department of Energy, Mines and Resources and the proponent is Mobil Oil Canada Ltd.

The Initiator and Proponent are expected to observe the intent rather than the letter of the guidelines and to make every effort to identify and describe all environmental impacts likely to arise from the Project, even for those situations not explicitly identified in these guidelines. Any changes or major deviations from these guidelines are to be approved by the Environmental Assessment Panel prior to implementation.

It should be recognized that the EIS and its review by the public and technical agencies provide the Panel with a pool of information as a basis for its report.

It is possible that these guidelines include matters which, in the judgement of the proponent, are not relevant or significant to the project or to the study area. This should be so indicated by the proponent in the EIS. The public and technical agencies will have the opportunity to comment upon this judgement. Where the Panel disagrees with the proponent's statements in this regard, it may require additional information from the proponent before proceeding with its Report.

## 2.0 SCOPE

These guidelines are intended to apply to the entire Project, including the development/production systems and associated works. All major alternatives that have received active consideration are considered to be parts of the Project. Construction and operational support activities and facilities (such as temporary work camps, storage areas and transport and communication systems) are also considered to be parts of the Project.

## 3.0 DEFINITION OF TERMS

The following terms used in this document bear definition:

Associated Projects:

- construction, transportation and similar projects that will be required or will follow as a direct result of the initiation of the Project.

Environmental Assessment Panel (Panel):

- a group of experts appointed to review the environmental effects of the project.

Environmental Impact Statement (EIS):

- a documented assessment of the environmental consequences of an intended project, or group of projects, which may have significant environmental consequences. The EIS is completed early in the planning stages of development in accordance with guidelines established by the Panel for that undertaking.

Initiator:

- a federal department or agency which intends to undertake or sponsor a project, or group of projects, having possible environmental effects and which is thereby required to take appropriate action according to the Environmental Assessment and Review Process.

Project:

- all activities associated with the development/production of oil and gas on the northeast Grand Banks which could be affected by this project, including Hibernia and Ben Nevis and associated delineation well areas and other prospects within the Jeanne d'Arc sub-basin. It also includes all works, facilities, services and activities required to construct and operate the system and all major alternatives that have received active consideration.

Project Area:

- the exact boundaries of the proposed development on the northeast Grand Banks are to be described in the EIS together with a precise description of all associated projects both offshore and onshore. The area of the project is to be limited by the environmental impact as predicted in the EIS. For the physical environment this could extend beyond a strict geographical definition of the northeast Grand Banks,

dependant upon trajectories of oil spills and the effect on biological systems, particularly natural resources used by men, (i.e. fisheries). Impacts on the socio-economic environment could also extend beyond the land-mass immediately contiguous to include other areas of the Province of Newfoundland and Labrador and the east coast of Canada.

Proponent(s):

- a company, or other organization outside the federal government which intends to undertake a project, or group of projects, within the scope of the Environmental Assessment and Review Process, having possible environmental effects.

**4.0 OVERVIEW SUMMARY**

The Summary will consolidate the important findings of the report and will be written in such a manner as to allow reviewers to focus immediately on items of concern. It should be written in terms understandable to the general public and in a format that allows it to be extracted directly for publication by the media, or for use by senior executives requiring a quick appraisal of the situation.

The Summary should be published separately as well as being included in the EIS and should briefly describe the Project and its rationale, identify the proponent(s) and initiator, the possible major environmental impacts, the avoidance and/or mitigating measures to be implemented, and the significance of any residual environmental impacts. Aspects of the development which might stimulate public concern should be described with particular clarity. The Summary must also clearly identify data gaps or knowledge deficiencies, and the limitations these impose on the Environmental Impact Statement.

## 5.0 THE PROJECT SETTING

### 5.1 Declaration and Objective

The Proponent(s) and Initiator of the Project must be identified and the former must assume full responsibility for statements and judgements appearing in the Environmental Impact Statement.

If the project has more than one Proponent, the responsibilities of each must be clearly identified. The proponents of associated projects, upon which this Project depends, should also be identified.

The objective of the project should be clearly stated.

### 5.2 Project Rationale

This section should convey the primary purpose of the proposed project and how the proposed action fits into international, federal, provincial, regional and municipal plans agreements and requirements. The proponent should provide evidence of the oil or gas demand for the proposed development and the estimated discovered/undiscovered recoverable oil and gas resources. The timing of the project should be outlined with respect to this expected national/global demand and supply. Forecast curves reflecting existing and historic oil and gas demands and the location of these demands should be outlined. Methodology used in deriving estimates of supply and the qualifications and assumptions attached to them should be stated. The principal purpose of this section is to indicate the perspective against which potential impacts may be judged.

### 5.3 Alternatives

The proponent should provide a brief description of the major development/production/transportation strategies and technologies considered, including those rejected, in sufficient detail to allow the reviewer to comparatively evaluate the costs, benefits and environmental risks of the alternatives. Significant differences in impacts among the alternatives considered should be described.

Utilization and extension of existing facilities where they exist and cancellation, postponement, or a different pace of development of the activity should be considered as alternatives.

### 5.4 Interrelationship with other proposal and projects

The proponent should specifically identify all associated projects that may be affected by the proposal and which in turn may cause environmental concern. Discuss the interrelationships of such associated projects and environmental concerns identified whether or not these concerns fall within the jurisdiction of the proponent and/or Initiator. Special attention should be paid to Newfoundland and the east coast of Canada and may include on-shore support, infrastructure, refining, trans-shipment and storage facilities.

The proponent should also generally discuss in terms of their environmental effects the long-term, probable developments or activities resulting from the proposal.

## 6.0 THE PROPOSAL

All alternatives not discarded in 5.3 should be discussed under each of the headings below. Factors common to all alternatives should be discussed first, followed by a description of those unique to individual alternatives. The probability of use associated with each alternative should be provided so as to give an indication of the proponents intentions.

The Project plans must conform to existing regulations, guidelines and laws, which may be identified by referring to the appropriate agencies. The proponent should also demonstrate that consultations have been held with appropriate planning authorities.

### 6.1 General Layout

The Proponent(s) should provide a map showing the location of major Project facilities in relation to easily recognizable geographic features and human settlements within the Project area.

In addition, the Proponent(s) should provide suitable maps and diagrams showing the detailed locations and typical examples of:

- a) structures, platforms and vessels for; drilling, production, storage, shipping etc.
- b) pipelines and other lines required for injection, collection, transportation, service, etc.
- c) associated equipment including well-heads, manifolds, risers, controls, transfer and mooring structures, etc.
- d) ancillary facilities including residences, communications, fuel, water, drilling supplies, waste disposal, personnel and supply transportation systems.

## 6.2 Construction Details

The following items should be described in concise terms:

- a) the method(s) and timing of construction for each part or phase of the proposal both on and off site.
- b) the location and quantities required, and method of acquisition of construction materials or services.
- c) manpower requirements (numbers and types).
- d) routes and details of transportation facilities and equipment.
- e) location, size, duration and services of construction facilities.
- f) interruption to natural physical processes in terms of timing and other pertinent variables.
- g) any debris, effluents and emissions, including noise, in terms of quantity and characteristics caused or attributable to construction.
- h) the location, method of construction, dredging requirements and scheduling for any ports and marine terminals.

### 6.3. Operation and Maintenance

The following items should be described in concise terms where applicable:

- a) operational methods and limitations of the proposed production/transfer systems including anticipated down-times due to weather/ice etc.
- b) the important timing and other commissioning details of the proposal.
- c) specifics of routing, destination and scheduling of transportation systems.
- d) manpower requirements.
- e) other information concerning the drilling/production/transportation systems such as certification and inspection requirements, performance history, capacity, B.O.P. equipment and procedures, design against environmental threats (e.g. moving ice, bottom scouring by icebergs, primary and secondary earthquake effects, etc.), site position systems and/or equipment, navigation and/or communication equipment, and qualifications of personnel.
- f) proposed methods of handling or disposing of the gas obtained during oil production (re-injection, flaring, transportation)
- g) information on support craft (air and water) with respect to environmental threats (e.g. storms, wind, wave, currents and fog, ice and icing conditions, etc.) navigation and communication equipment and qualification of crews.
- h) any marine seismic activities associated with the drilling and production program(s).
- i) any interruption to natural physical processes caused by the operation in terms of timing, space and magnitude.

- j) expected releases, or stockpiles of waste or toxic substances used or generated during all phases of the proposal. Identify all potential air, land or water contaminants and outline methods of waste disposal to avoid health hazards to humans and degradation of the environment.
- k) the nature and quantity of non-biodegradable debris released or lost as a consequence of drilling, production and transportation activities.
- l) the quantity and quality of liquid and solid by-products of drilling, production and transportation activities, including oil and oily debris, their storage, disposal and ultimate fate.
- m) information should be provided on water requirements from fresh or marine sources including volumes, seasonal times of extraction, treatment and disposal for domestic, camp or operational purposes.
- n) sewage treatment and disposal facilities,
- o) the composition, volume and method of handling and disposal of solid wastes should be provided.
- p) the nature (quality and quantity), transportation, storage, use, treatment and final disposition of any biocide, pipe coating materials, anti-corrosion materials, flushing agents, drilling fluids, special lubricants and other toxic substances proposed for use in the project and information on their expected persistence, mobility and ultimate fate in the surrounding environment.
- q) quantities and qualities of atmospheric emissions such as sulphur compounds, hydrocarbons, nitrogen oxides, water vapour, heavy metals, thermal emissions and any other potential pollutants produced during all phases of the project.
- r) the quantity and quality of other atmospheric emissions such as dust, noise, and odour produced by H<sub>2</sub>S and other by-products of the proposal.

- s) where applicable changes in the use and frequency of existing transportation modes.
- t) documentation in support of all technical and operational aspects including the results of field tests under comparable operating conditions of the proposed equipment of recent origin.

#### 6.4 Environmental Hazard Prediction Systems

Describe surveillance and prediction systems needed to provide adequate protection from weather, ice-bergs and sea-ice, sea-state and other environmental hazards, and the manner in which these will be integrated with or will incorporate observing and predicting systems of the Federal Government.

#### 6.5 Abandonment

Plans for abandonment should include:

- a) what equipment and facilities, both on shore and offshore will be removed when the project is abandoned temporarily or permanently, how and when these will be removed and how and when the area will be reclaimed stabilized or otherwise secured.
- b) details for the release, loss, storage or ultimate disposal of any gaseous, liquid, or solid contaminant stored or otherwise contained in the area.

## 7.0 DESCRIPTION OF EXISTING ENVIRONMENT

A general description of the environment based on available data should be presented in Section 7.0. This information will assist the reader in understanding the general pre-development setting. It is expected that, based on a general understanding of the environment as outlined in Section 7.0 and a description of the project as outlined in Section 5.0 and 6.0, the proponent(s) will be able to list the areas of possible impact. The proponent(s) will collect further data as required in order to assess the magnitude of the impact. The environmental impact will be defined in detail in Section 8 together with the mitigation measures proposed and the anticipated residual impact in Section 9. All pertinent data shall be included in Appendices. If this is not feasible because of quantity, the data shall be made available separate from the EIS. Care should be taken however not to limit Section 7 to a compilation of data but rather to describe the conditions in the vicinity of the development site in terms of inter-related ecological mechanisms and processes for the purposes of prediction in Chapter 8.

In particular Section 7.0 should describe the natural and socio-economic environment in the area affected by the project as it exists prior to Project development with emphasis being placed on those components that are of particular significance. Where knowledge gaps exist, these should be noted with reference to efforts to fill these gaps where appropriate. A qualitative and quantitative description of present resource use should also be included. Maps of appropriate scale, graphs and charts should be included in each subsection to illustrate resource, and environmental information. Sources of information should be identified and acknowledged.

The intent of this section is to provide the context or baseline description of the environment in the Project Area to create a basis for identifying the possible impacts of the Project. The following outline of information requirements is intended as a guide to the nature, scope and level of detailed of information necessary to adequately describe the existing environment. This outline is intended to be neither restrictive nor exhaustive and the Proponent(s) will apply judgement in selecting the baseline environmental components likely to incur significant impact from the Project activities. The eco-systems at risk should also be considered in a regional, national and international perspective with comparisons for similarity or uniqueness as appropriate.

Where it is apparent that the present environment is changing a prediction of future conditions without the proposed project should be made.

## 7.1 Geology & Bathymetry

- a) physiographic and tectonic settings and geologic history of the region pertinent to review of the project including:
  - (i) surficial units in the project area.
  - (ii) bedrock geology and hydrocarbon reserve potential.
  - (iii) tectonic history and hazards with particular reference to foundation instabilities.
- b) surficial and engineering geology with particular reference to properties that are pertinent to review of the project including:
  - (i) bathymetry, microtopography and surficial sediment distribution on the sea floor.
  - (ii) age, lithology, texture, structure and distribution of the surficial geological units underlying the seabed.

- (iii) features in the sea-bottom units requiring special engineering considerations such as erosional channels, unconformities, salt domes, boulderfields, gas charged sediments, buried iceberg furrows.
- c) the spatial distribution of features and the magnitude and frequency of dynamic processes that could affect the project including:
  - (i) geopressure
  - (ii) faults and slumping
  - (iii) surface sediment activity (including sand waves and current scours), conditions of wave and current under which the surface sediments would be mobile. Extent to which sub-bottom sediments will be mobile if the surface sediments are disrupted.

## 7.2 Climate and Air Quality

Consider and discuss the following where applicable:

- a) regional climatology - climatic zone and main features.
- b) mean and extreme temperatures, frequencies and durations of temperature and windchill ranges which may have significant effects on operations. Values for various return periods should be included.
- c) wind and atmospheric stability (e.g. inversions) as they relate to the concentration and dispersion of airborne pollutants, and in combination with low temperature, to the formation of ice fog.
- d) winds in terms of frequency, direction and duration of critical speeds, mean extreme and frequency where persistantly on-shore or onto ecologically sensitive areas.

- e) monthly mean and extreme precipitation and the potential for accumulation of ice or snow on structures as a result of precipitation or freezing spray, and the occurrence of air-frame icing which could significantly restrict aircraft movements.
- f) probability of specific significant ranges of low ceilings and visibilities associated with fog, cloud, precipitation or blowing snow as factors influencing operational efficiency or emergency procedures.
- g) extreme storms relative to security of drilling/production systems, support craft (air or water) and on shore facilities.
- h) frequency of occurrence of combined events which impact on offshore operating limits.
- i) details of the establishment of a weather sea-state and sea-ice reporting and prediction system and its integration with relevant physical oceanographic data.
- j) the duration and adequacy of the climate information base.
- k) levels of air pollutants such as sulphur compounds, NOX.

### 7.3 Oceanography

Consider and discuss the following where applicable with particular attention to items that are pertinent to section 8.2.

- a) spatial and temporal variability of surface, sub-surface, and near-bottom currents, including mean and seasonal flows, tides, inertial period motions, gyres and upwelling areas, etc.
- b) the presence of features, such as oceanic fronts, whose effect is to cause a convergence or divergence of the flow, thus serving to concentrate or disperse any material carried by the currents.

- c) wave climate including extreme values as they relate to structural integrity, disruption of operations, and contingency planning (including storm surges where applicable).
- d) sea ice (including icebergs, bergybits and growlers,); movements, characteristics and location of their occurrence, extremes, types, probability of critical or significant occurrences, which may effect operations, impacts and mitigation measures including regular and relief wells, oil spill counter-measures, stresses on structures, etc.
- e) ice scouring with particular reference to the frequency and depth of scours and the relationship between water depth and scour distribution.
- f) sea surface and subsurface temperatures and profiles.
- g) chemical oceanography including salinity, dissolved oxygen, nutrients, trace metals, hydrocarbon levels and water quality including turbidity.

#### 7.4 Terrain

Describe the geo-morphology and biophysical nature of the shorelines and immediate hinterlands potentially affected by oil and any impacts that could occur from land-based associated activities.

#### 7.5 Flora and Fauna

This section should describe the ecosystems within the region potentially affected by the proposed project; (including trophic relationships). Account should be taken of natural variability so that any effect that may be imposed by the project can be considered in context. The following should be considered and discussed with reference to major

habitats, including water columns & sea floor (nearshore, offshore, inshore, intertidal and subtidal), on and under ice where applicable.

a) Microorganisms:

- distribution and abundance of indigenous microbiota, with special reference to oleoclasts.

b) Phytoplankton

- species composition, distribution, abundance and production on a seasonal basis.

c) Macrophytes

- species composition, distribution and abundance with special emphasis on existing (and potential) commercially important species.

d) Zooplankton

- species composition, distribution, abundance on a seasonal basis;  
- evaluation of biomass on a seasonal and geographic basis, including an analysis of the degree of variation.

e) Benthos:

- species composition, distribution and abundance on a seasonal basis in areas liable to be affected by any facet of the drilling operation, together with supporting sediment data with respect to particle size

distribution and susceptibility to oil contamination. Commercially valuable shellfish should be reviewed as a separate species.

e) Fish:

- seasonal distribution and abundance of pelagic eggs and larvae;
- seasonal distribution and abundance of juveniles and adults with special reference to their coastal movements along the east coast;
- fisheries (marine, diadromous and freshwater species) with emphasis on seasonally important areas and fish densities migration behaviour, spawning requirements, and sensitivities.

f) Mammals:

- population size, seasonal distribution and movements of nearshore and offshore species;
- designation of areas important to any species, e.g. nursery, feeding, calving.

g) Marine birds:

- seasonal distribution, movements and abundance of marine bird populations in nearshore and offshore areas;
- location and population estimates of seabird colonies;
- identification of environmental features affecting the timing of nesting and migration of the various species of marine birds in the region;

- identification of nesting and breeding and overwintering areas for water fowl.

h) Sensitive Species:

- the identification of any species which may be sensitive to the proposed development and that act as important food resources for other co-habiting species;
- identification of species that may be considered rare or endangered, or important for subsistence, scientific commercial or recreational use.

i) Historic Trends:

- historic trends in the use of the area by animal populations, including those of direct and indirect importance as well as those endangered by mans activities.

j) Biological Systems:

- trophic relationships with emphasis on community shifts and multispecies dynamics;
- predevelopment levels of potential environmental contaminants in the physical environment, and in selected indicator species;
- the capacity of biological systems to assimilate pollutants which may result from the proposed development or activity.

## 7.6 Socio-economic issues and Resource Use

Consider and discuss the following where applicable; in relation particularly to the geographic areas of Newfoundland and Labrador likely to be affected by the project:

- a) the distribution and characteristics of the human population including such aspects as population trends and composition, traditional life styles, communities, employment, public facilities and housing.
- b) economic, cultural, and social setting of the region affected including present and projected sources of revenue without the project. Information on industry, construction, government and support services as well as direct resource use, such as fishing and farming, should be provided, including locations.
- c) historic, existing, and projected future resource use in the area of, and influenced by, the proposed development and associated projects, with particular reference to identification of fisheries, fishing locations and fish processing plants should be discussed in detail. The economic and commercial fishery values in areas likely to suffer impact, types of gear used, seasonality and land-based industry dependant up on the fisheries should be described (including boat-building).
- d) demand and supply for land and harbour space required for support facilities; ownership (public, private or special status).

- e) description, limitations and projected changes in present support infrastructure including roads and water.
- f) existing or potential visual, recreational, tourism, and subsistence use of land and resources.
- g) areas of special status such as ecological reserves, sanctuaries, areas of archeological, historic or paleontological significance.
- h) projected urban and regional development with particular reference to housing.

## 8. ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

The expected environmental and socio-economic effects of the project (including alternatives identified in Section 6) should be discussed by issue in this section as well as the amelioration and mitigation measures. Mitigation should be broadly interpreted to include the issue of compensation and include information on insurance, liability and associated schemes and the costs of clean-up.

The assessment of short and long-term potential effects should be made on the basis of information collected from existing sources and on information collected in the field to supplement what is available. The

extent, nature and effect(s) of knowledge gaps should be identified, particularly where such deficiencies have affected the prediction of impact. Needs for further research or data collection should be identified.

Potential impacts in the area to be affected by the proposal should be discussed in terms of existing qualities, quantities and values, and should be identified in the design, construction, operation, maintenance and abandonment phases of the project. Impacts should be considered as international, national, regional, local or site-specific and include the analysis used to define them.

Information that may be required to carry out a satisfactory assessment shall include, but shall not necessarily be restricted to, topics outlined in this section. Options and measures available to avoid, minimize or mitigate harmful effects and to enhance beneficial effects are to be investigated and discussed under each topic. Reference should be made to those measures in place as a result of government rules, regulations and statutes. Plans for surveillance and monitoring of environmental effects should also be detailed. Impacts identified as major should be discussed in detail.

All potential environmental and socio-economic impacts in the area to be affected by the proposed development are to be identified in terms of the headings identified in Section 7 and other factors considered pertinent to the particular task.

This section should include the impact of the project on the existing environment in the broad context and upon the ecological interrelationships between the major species or groups of species at different trophic levels, either direct or indirect, harmful or beneficial, with emphasis on those actions likely to cause major ecological disruptions.

Thus the biological impacts considered should include the interrelationship between primary producers, invertebrates, fish, marine and coastal birds and mammals. Interference with fish and wildlife populations and the effect this interference may have on the use of these populations by man should be described. Changes in fish and wildlife habitat with particular reference to water quality should be included as well as shoreline habitat.

Similarly, socio-economic considerations should provide specific information and an analysis of interrelationships whenever impacts are likely to occur. Special reference should be made to the fishing industry.

The analysis used in defining potential impacts should be discussed.

A summary of this section should be made. This should include all concerns raised as well as the options and measures available to alleviate those concerns.

#### **8.1 General**

The nature, effects and constraints arising from the proposed project should be considered as applicable to the construction, production and abandonment phases with particular reference to the following items.

- a) Oil pollution from all sources with particular regard to lost fishing opportunities, tainting of product, fouling of gear, and other related effects, including interruption of supply on segments of the economy dependant upon fisheries.
- b) Hazards, accidents or restraints arising from geological, weather, oceanographic or other conditions and affecting the project and other activities in the area.
- c) Lost fishing opportunities due to exclusion zones.
- d) Sea bed disturbance and solid wastes, (including debris which might foul fishing equipment).
- e) Underwater noise.
- f) Liquid waste, quantities and composition, including drilling mud and fluids disposal and discharge of formation and process water.
- g) Supply sources for materials including water.
- h) Support infrastructure including its capacity to absorb demands and additional requirements created.
- i) Population and employment changes and redistribution including attraction of work force into the oil industry and effects on other industries, particularly fishing due to loss of basic skills and reduced catching & processing capacity.
- j) Requirements for development in support of population changes including housing, infrastructure, and government services.

## 8.2 Contingency Plans and Counter measures

Following a general introduction and definition of the geographic area where the contingency plans will apply contingency planning is to be discussed in two phases:

### 1. Risk Analysis and Probability:

- in the event of a major episodic spill (well blowout, ruptured pipeline or tanker accident) estimate the type and flow rate and duration of gas and oil (or gas condensate) likely to be released. Identify the probable physical appearance of the spilled hydrocarbon (i.e. surface slick, mousse, emulsion, subsurface droplet, sheen, tarballs, interaction with ice, etc. Include a discussion of the risks associated with the project and areas considered sensitive to oil pollution. The probability of episodic and chronic spills of various sizes and types during exploration, production or storage should be estimated and detection methods described. Estimates of, and methodology used in determining maximum, undetected losses should also be included. Similar information should be provided for other potential pollutants.

### 2. The risk analysis outlined above should be used to:

- a) describe and estimate the capabilities and limitation of any counter-measures that may be undertaken to control pollutants including oil on the sea surface (with or without the presence of ice) beneath the surface, at the sea-land interface and on land. Discuss the capability and probability of readily stopping or controlling episodic spills at source.

- b) discuss the capability, timing and logistics of drilling a relief well (include the availability of equipment) and alternatives to a relief well.
- c) discuss the threat of ice, and severe storms and other weather conditions to the production and transportation systems and describe the countermeasures and dangers involved. A clear statement of the configurations, procedures, minimum advance warning times and time for reconnection before operations can resume should be included in this section.
- d) present a model to predict scenarios for the trajectory and dispersion of oil on the surface of the ocean using the oceanographic and metereological inputs deemed necessary taking account of the presence of sea ice where applicable. Discuss the limitations (spatial and temporal) of the model, and the data basis used for defining and testing the model. Attention should also be given to the problem of subsurface transport and deposition.
- e) describe the organization and logistics required to track, contain and clean up a spill involving oil, gas, condensates and other pollutants for various scenarios of seasons and weather. Use scenarios for worst possible weather/oceanographic conditions. The following factors should be taken into account where applicable:
  - notification procedures and chain of command;
  - roles and responsibilities of industry and government personnel including government responsibility centers and established reporting procedures;
  - interface with existing or proposed contingency plans (company, agency, provincial, national and international);

- personnel and equipment requirements (provide an inventory and location for the necessary communication, containment, cleanup and disposal equipment);
- time required for effective action;
- methods of estimating the trajectory and dispersion of the gas in the atmosphere in the case of sour gas.

f) discuss the behaviour of gas and oil escaping from a well blow-out or pipeline rupture at the bottom of the sea or oil/gas from a tanker.

Include in the discussion:

- estimates of how much gas and oil might remain on the seafloor or in the water column through dissolution or change of state;
- methods of estimating the trajectory and dispersion of the gas and oil while in the water column;
- ultimate fate of the oil, including times for biodegradation, or other disposition.

g) discuss the threat of a major fire associated with or on the development (including the immediate area surrounding it and ancillary facilities) and describe the fire prevention, detection and suppression during construction, operation and abandonment of the proposal.

h) describe the training program for field personnel and proposed oil spill exercises.

i) measures underway to increase the effectiveness of presently existing spill control and clean-up measures.

j) provide information on the ultimate disposal for recovered pollutants including oil and oily waste.

## 9. RESIDUAL IMPACTS

The impacts that remain after all practical mitigating measures have been incorporated into the alternative development proposals should be discussed in terms of the nature, extent and duration of all such impacts on the environment and socio-economic spheres and the implications to international, national, regional, local and site-specific interests. Include in this discussion a prediction of expected effects from a clean-up operation should an oil spill occur.

## 10.0 APPENDICES

The appendices should include lists of references cited, lists of reports prepared in support of the assessment, lists of field data used to describe the environment and to undertake the impact analysis. All information must be made available to the Panel upon request. Additional copies of the material must be made available for public perusal at locations to be determined.







